Virtuoso Infotech Pvt. Ltd.

About Virtuoso Infotech

➢ Fastest growing IT firm; Offers the flexibility of a small firm and robustness of over 30 years experience collectively within the leadership team

➢ Technology expertise & passionate team

➢ Successful client engagements across India, USA, UK, Australia and Argentina

➢ Handle enterprise solutions that involve **30,000 active users**, more than 20 servers, **data volume as big as 5 million entries per day**

Technological Advances in Healthcare

- Bhargav Mehta

Agenda

➢ Introduction to how technology is affecting the healthcare domain

➢ Artificial Intelligence

➢ IoT - Health Monitoring and Assistance

➢ Augmented Reality

➢ Artificial Organs

➢ Minimally Invasive Surgeries

Introduction

➢ With advancements in technology, the sector which has seen the most advancements is Healthcare.

➢ Precision and Accuracy.

➢ From Curing to Caring.

➢ Decentralization, treatment at home.

➢ Organized, Automated, Integrated and Complete.

➢ Real Time.

Artificial Intelligence

➢ Using algorithm, data patterns and machine learning we can analyze relationships between prevention or treatment techniques and outcomes.

➢ Used for diagnosis, targeting, medications, monitoring to post-recovery care.

➢ It will be helpful in determining chronic and life threatening diseases where trained doctors are less.

➢ Getting the diagnosis early can almost always help in the treatment. With AI the diagnosis can be non-invasive and routine.

➢ AI can also help in predicting other major events such as patient's likeliness of getting better, time for recovery and chances of patient to get sick again.

Artificial Intelligence

➢ Main advantage the AI has in pre or early determination of disease is contextual analysis based on the other data available.

➢ **Radiology -** study at Stanford which has results presenting that the algorithm that they created can detect Pneumonia better than radiologists.

➢ **Cancer -** Google's LYNA can be used to pick up cancer cells on tissue images and detect metastatic cancer 99% of the time.
- An interesting note is that the researchers found that pathologists who worked with LYNA performed better than both pathologists without the tool and the tool used on its own.

➢ Other companies working extensively on implementations of AI in healthcare are IBM, Microsoft, Apple, Intel etc.

Internet of Things

➢ IoT or Internet of Things implemented for special medical needs is also known as IoMT or Internet of Medical Things.

➢ We saw advantages that AI proposes in healthcare domain. But for this what is the one core thing that is needed? And where will we get it from?

➢ Here the IoT or Internet of Things come in to play.

➢ IoT provides us with immense pool of technology that can help us in improving the healthcare provisions for the patients.

➢ The most important advantage IoT has is monitoring.

Internet of Things

➢ It can be of immense help for old age people who are living alone or for people with restricted mobility.

➢ It can supplant doctor visits and assist them in keeping their necessary vitals in check under real time.

➢ It can also help in tracking the patterns leading to the event.

➢ It help in proactive and responsive treatment.

➢ Above all, it gives a sense of satisfaction, comfort and protection to the user or patient

Sensors

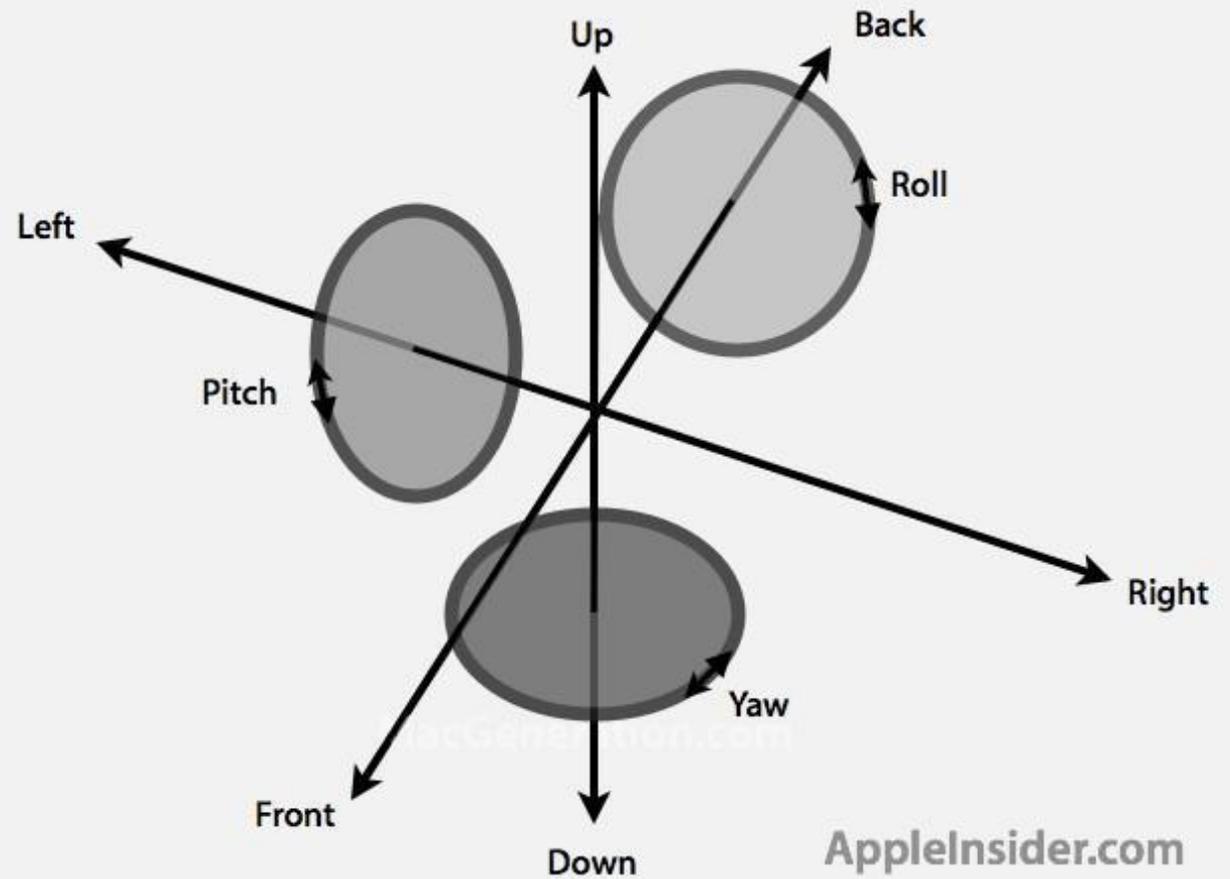➤ Heart Rate Sensor

➤ Light/ Image Sensor

➤ SQUID
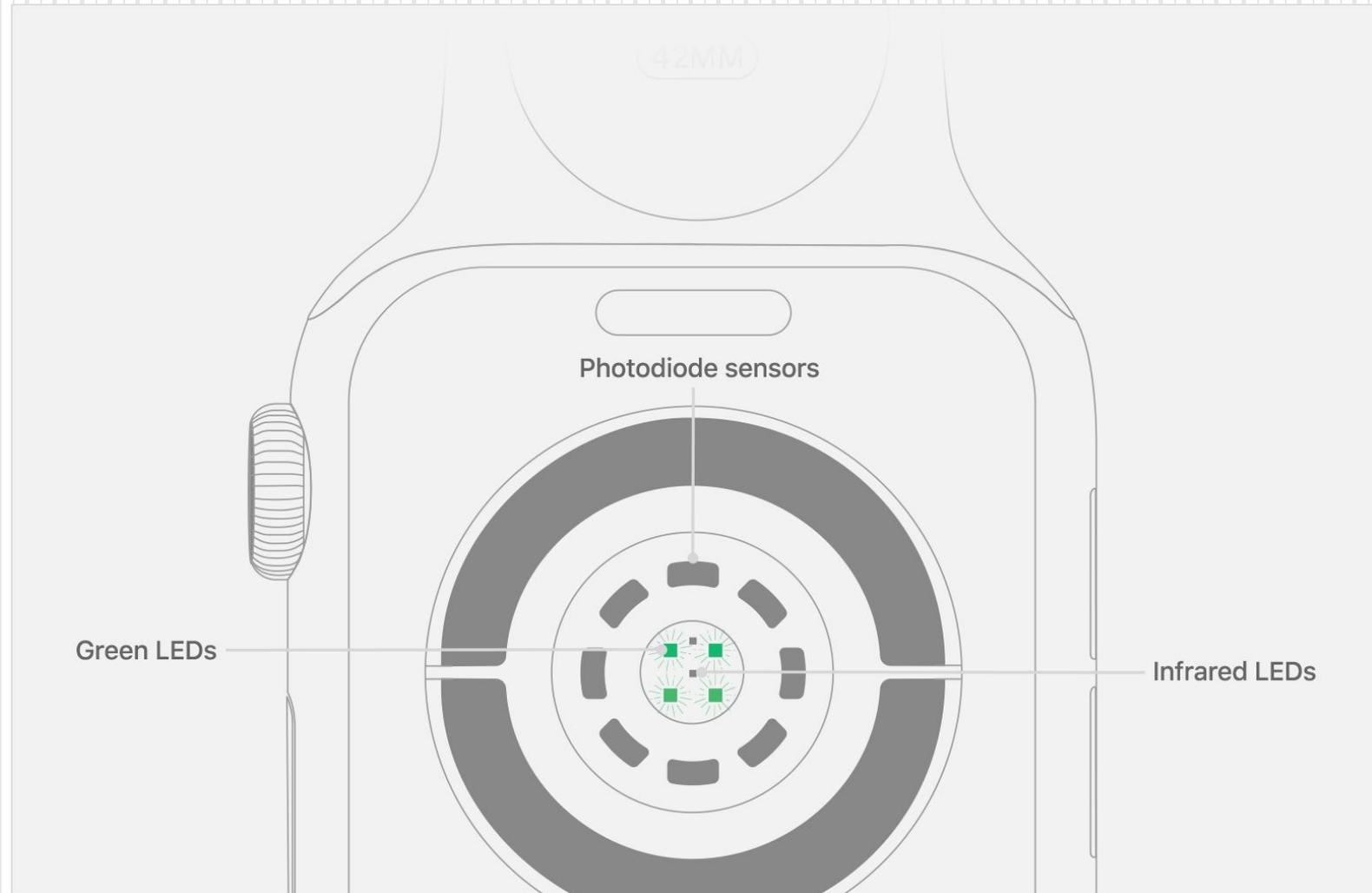
Sensors

- Accelerometers

- Pressure Sensors

- Temperature Sensors

Accelerometers and Gyroscopes
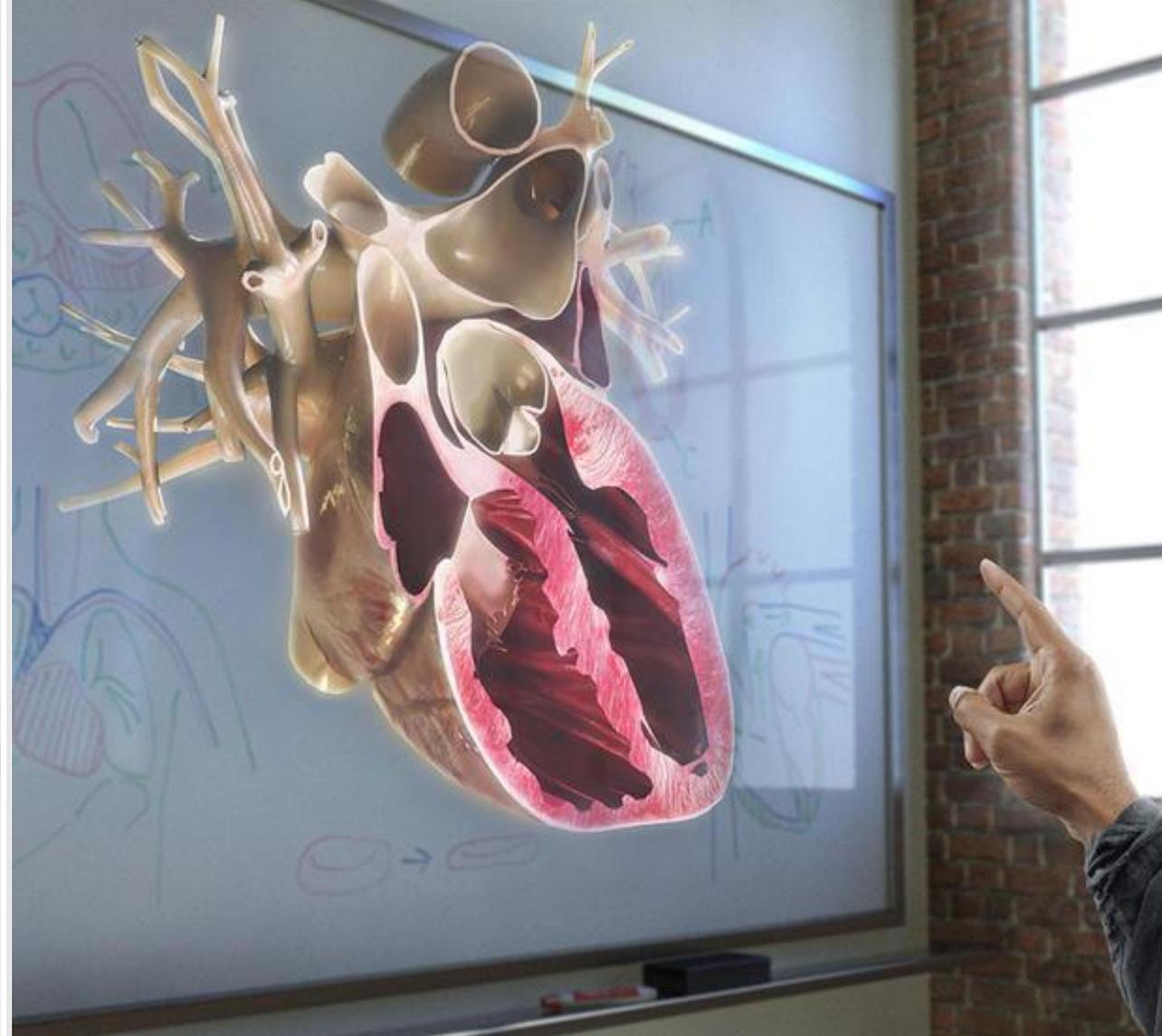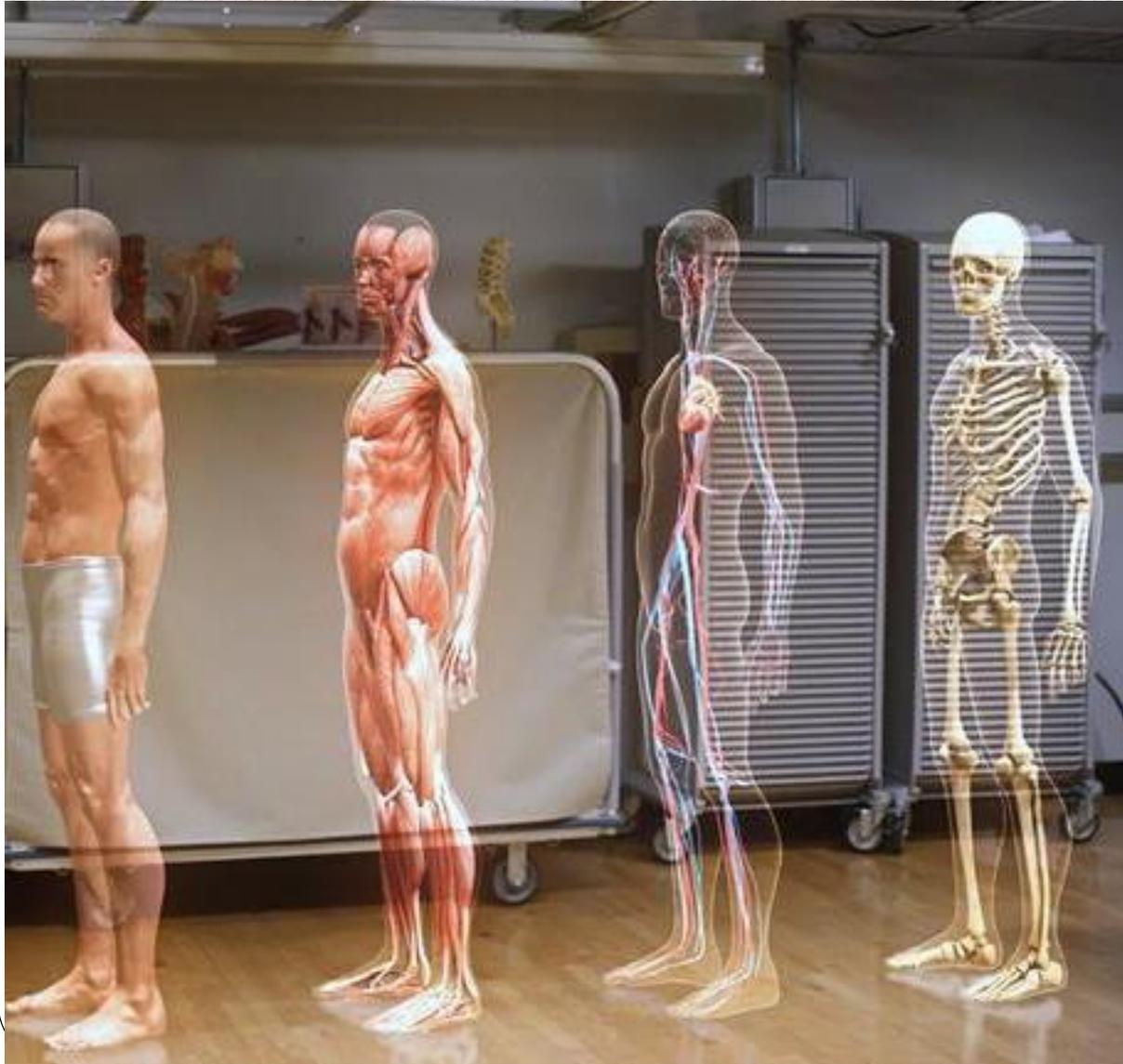Sense linear and angular acceleration

Sensors

➢ BioSensors

- Electrochemical Biosensor

- Blood Glucose Biosensor

- Potentiometric Biosensor

- Immuno–Biosensors

Augmented Reality

Augmented Reality

➢ Augmented Reality has a major application in learning for healthcare.

➢ With the help of augmented reality it is possible to easily understand the composition of body and organs.

➢ It can also help in training of doctors where they can simulate and visualize the surgeries before actually operating.

➢ It can also help nurses and doctors in pinpointing the exact locations for injections, surgery cuts etc.

Artificial organs

➢ The most common application of artificial organs is Active Bionic Prosthetics or Artificial Limbs

➢ Other important artificial organs are
- Artificial Urinary Bladder
- Neuroprosthetics [Brain]
- Cochlear Implant
- Visual Prosthetics
- Artificial Heart
- Artificial Liver
- Artificial Lungs

Active Bionic Prosthetics

➢ Artificial device that replaces a missing body part, which may be lost through trauma, disease, or congenital conditions. Prosthetics are intended to restore the normal functions of the missing body part.

➢ Neural or Bionic Prosthetics

➢ The way to control a prosthetic limb is by listening to muscles remaining in the residual limb that the patient can still contract.

➢ Muscles generate small electrical signals when they contract, so electrodes placed on the surface of the skin can measure muscle movements.

Active Bionic Prosthetics

➢ Although no buttons are physically pressed by the muscles in this case, their contractions are detected by the electrodes and then used to control the prosthetic limb.

➢ Prosthetic limbs that function in this way are also called **myoelectric**.

Minimally Invasive Surgeries
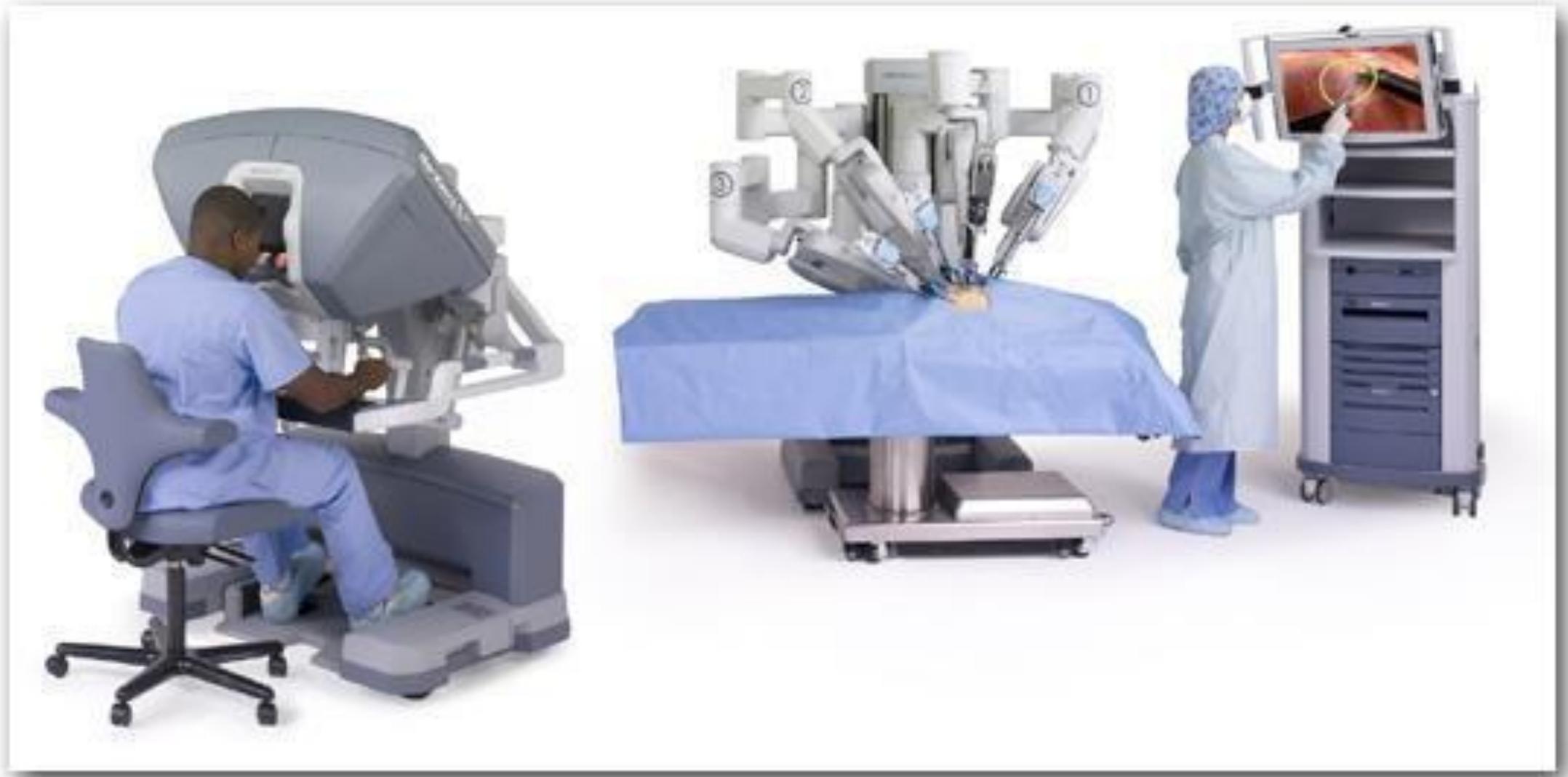
Minimally Invasive Surgeries using Robotics

➢ Advanced robotic systems give doctors greater control and vision during surgery, allowing them to perform safe, less invasive, and precise surgical procedures.

➢ During robotic-assisted surgery, surgeons operate from a console equipped with two master controllers that maneuver four robotic arms.

➢ By viewing a high-definition 3-D image on the console, the surgeon is able to see the surgical procedure better than ever before.

➢ Computer software takes the place of actual hand movements and can make movements very precise.

Minimally Invasive Surgeries using Robotics

➢ The benefits of minimally invasive robotic surgery can include
  - Small incisions
  - Less pain
  - Low risk of infection
  - Short hospital stay
  - Quick recovery time
  - Less scarring
  - Reduced blood loss

➢ Not all minimally invasive procedures are completed with robot assistance, and not all medical cases are right for robotic-assisted surgery— some patients may benefit from endoscopic or open (traditional) surgery.

Minimally Invasive Surgeries without Robotics

➤ Not all minimally invasive procedures are completed with robot assistance — some patients may benefit from endoscopic or open (traditional) surgery.

➤ Non-robotic minimally invasive surgery is also known as endoscopic surgery. You also may be familiar with terms like laparoscopic surgery, thoracoscopic surgery etc.

➤ These are minimally invasive procedures that utilize an endoscope to reach internal organs through very small incisions.

Minimally Invasive Surgeries without Robotics

➢ During endoscopic surgery the surgeon inserts a thin, flexible tube with a video camera through a small incision or a natural orifice like the mouth or nostrils.

➢ The tube has a channel to utilize tiny surgical instruments, which the surgeon uses while viewing the organs on a computer monitor.

➢ This technique allows the surgeon to see inside the patient's body and operate through a much smaller incision than would otherwise be required of traditional open surgery.

Thank You!

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